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10/757,954	01/15/2004	Robert Bruce Grant	M03B330	5080

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EXAMINER	
OLSEN, KAJ K	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/757,954	GRANT ET AL.	
	Examiner	Art Unit	
	KAJ K. OLSEN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 June 2009*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-6,8,11-15,17 and 20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6, 8, 11-15, 17, 20* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-6, 8, 11-15, 17, and 20 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

3. Applicant has amended claims 1 and 14 by stating that the reference environment is "not formed by the solid state oxygen anion conductor". This amendment appears to be an attempt to overcome the art relied on in the previous office action. However, it is unclear what the scope of the new limitation even is as it has no previous basis in the applicant's disclosure and appears to have been introduce solely in an attempt to read away from the relied on prior art. For example, applicant appears to be interpreting this new limitation as reading away from Inoue's use of a catalytic reaction from the electrolyte to release oxygen. Although that is one interpretation, another interpretation of this new limitation is that the oxygen anion conductor does not contribute to the creation of the reference environment. With such an interpretation, even the present invention wouldn't read on this new negative limitation because the present invention's anion conductor 12 defines the walls of the reference environment. If electrolyte 12 did not contain the reference gas, then there would not be any reference environment as any reference gas would just blend into the measurement gas. Hence, the environment barrier formed by oxygen anion conductor 12 forms at least in part the reference environment. Moreover, fig. 2 of

the present invention teaches that a controlled current source 34 is connected between an electrode 14 in the measurement environment and an electrode 36 in the reference gas environment (see specification p. 12, ll. 14-20. How does this embodiment of the present invention read away from what Inoue is essentially doing? Any current source connected between a measurement environment and a reference environment is going to either generate or consume oxygen within the reference environment based on the oxygen anion flow through the oxygen anion conductor. This again would then not read on applicant's new limitation even utilizing their interpretation of the limitation. Applicant cannot claim that they have surrendered this embodiment with the claim amendment because claim 8 is still pending and claim 8 appears to be drawn specifically to the use of an additional electrode in the reference environment. Because this new limitation has no basis in the originally filed disclosure, neither of these potential interpretations of the limitation can be excluded. If this new limitation can be interpreted as reading away from the present invention, then the scope of the invention as defined by this new limitation is definitely unclear.

4. This examiner has withdrawn the previous rejection of claim 4 (which the applicant pointed out appeared to actually be directed to claim 5) in view of the amendment to claim 5.

Claim Rejections - 35 USC § 103

5. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

6. Claims 1, 2, 4-6, and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue et al (USP 6,153,072) in view of any of Yamada et al (USP 4,722,779), Shibata et al (USP 4,882,033), or Gür et al (USP 5,827,415).

7. Inoue discloses an organic contaminant sensor (col. 2, l. 66 - col. 3, l. 5) comprising an electrochemical cell having a solid state oxygen anion conductor (zirconia) 12, a measurement electrode 16 formed on a first surface of the conductor with a reference electrode 14 on a second surface for exposure to a reference environment (fig. 10 and col. 13, ll. 40-48). The electrodes 14 and 16 of Inoue comprise a material for the dissociative absorption of oxygen (col. 17, ll. 42-54) and a means for monitoring the potential difference between the electrodes so that, in the absence of a organic contaminant, the potential difference between the electrodes assumes a base value (225 mV in fig. 12), and assumes a different value (>225 mV in fig. 12) in the presence of the organic contaminant. Fig. 12 further shows that the voltage difference between the presence and absence of the organic contaminant is indicative of the amount of organic contaminant (col. 28, ll. 11-21). With respect to the set forth means for controlling the concentration of oxygen within the reference environment, Inoue does not explicitly describe why the oxygen in the reference chamber is kept constant. Yamada, which the examiner suspects is what the unspecified means of Inoue is utilizing, teaches that the oxygen concentration at the reference electrode can be controlled by applying a constant current between the measuring electrode and the reference electrode such that oxygen environment at the reference electrode is constant. See Yamada col. 6, ll. 11-30 and compare the sensor of fig. 3 of Yamada with fig. 10 of Inoue. Shibata discloses an alternate means for controlling the oxygen content of the reference compartment where additional electrodes 24 and 26 are utilized to help control the oxygen level

in the reference compartment 16. See fig. 1; col. 2, ll. 38-53; and col. 3, ll. 25-55. Gür discloses that the reference atmosphere can also be controlled with the use of an oxygen reference compound and the use of a oxygen reference compound obviates the need for a reference gas chamber coupled to a source of atmospheric air. See col. 2, l. 61 - col. 3, l. 9. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize any of the set forth means of Yamada, Shibata, or Gür for the unspecified control means of Inoue to yield the predictable result of having a gas sensor with a stable source of oxygen reference environment. With respect to the means for controlling the oxygen semi-permeability of the cell, the specification appears to evidence that this is just the set forth means for controlling the oxygen concentration (specification p. 8, ll. 12-18). Because the teachings of Yamada, Shibata, or Gür all teach an oxygen control means, then this constitutes a means for controlling the semi-permeability of the cell as well.

8. With respect to the new limitation that the reference environment not be formed by the solid state oxygen anion conductor, as the examiner discussed in the 112 rejections above, the scope of this limitation is clearly indefinite as the present invention appears to read away from it. Because the present invention teaches the use of the pump cell 34 to either pump oxygen to or away from the reference environment, akin to what Inoue in view of Yamada suggest, and applicant has not surrendered this embodiment (as claim 8 evidenced), the rejection over Inoue and Yamada is being maintained. With respect to the rejection of Inoue in view of either Shibata or Gür, these two secondary teachings teach the formation of the reference gas environment that is not formed by the oxygen anion conductor. See the response to the arguments below for a further discussion of Gür and Shibata.

9. With respect to a means for controlling the temperature, Inoue discloses heaters 2 and 8 for controlling the temperature. See for example col. 28, ll. 62-65.

10. With respect to the use of platinum or yttria stabilized zirconia, see Inoue col. 27, l. 63 - col. 28, l. 10.

11. With respect to the specified metal/metal oxide couple, see Gür col. 7, l. 60 - col. 8, l. 3.

12. With respect to controlling the oxygen concentration, see Inoue col. 28, ll. 11-14. With respect to controlling the pressure, because the claims do not specify what kind of pressure is being controlled (i.e. total or partial pressures), the fact that Inoue controls the partial pressure of oxygen constitutes a control of the broadly defined pressure as well.

13. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue in view of any of Yamada, Shibata, or Gür as applied to claim 2 above, and further in view of Aagard et al (USP 5,389,225).

14. The references set forth all the limitations of the claim, but did not explicitly recite the use of a thermocouple as part of the control means. Aagard also teaches the sensor comprising means (13) for controlling the temperature of the cell (col. 7, ll. 49-64) further comprising a heater (13) and a thermocouple arrangement (column 10, lines 4 - 13). It would have been obvious to one of ordinary skill in the art to have utilized the thermocouple arrangement taught by Aagard for the temperature controller of Inoue so that the temperature of the sensor cell can be regulated.

15. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue in view of Yamada as applied to claim 1 above, and further in view of either Shibata or Gao (USP 6,551,497).

16. Inoue and Yamada set forth all the limitations of the claim and Yamada further taught that a controlled current is applied between a measuring electrode and the reference electrode (col. 6, ll. 11-30). However, neither Yamada nor Inoue taught the use of an additional electrode in the reference environment for connecting this controlled current source to. Both Shibata and Gao teach alternate sensor configurations where oxygen is pumped into or out of a measurement chamber. Furthermore, both references also teach that the oxygen being pumped into or out of the reference chamber can be pumped either to a single reference electrode (like Yamada) (see fig. 5 of Shibata or fig. 3 or 5b of Gao) or to an additional electrode in the reference chamber (see fig. 1 or 4 of Shibata or fig. 1 of Gao). Hence, the prior art recognizes the equivalence between a single dual purpose reference electrode in a reference chamber and the presence of an additional electrode in the reference chamber that leaves the reference electrode decoupled from the current source. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of either Shibata or Gao and utilize an additional electrode for the oxygen pumping function of Inoue in view of Yamada because the substitution of one known reference chamber configuration for another requires only routine skill in the art. Furthermore, the use of an additional electrode allows the reference electrode to be decoupled from the current source ensuring that the reference electrode is not polarized away from its appropriate electromotive force potential.

17. Claims 14, 15, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue in view of any of Yamada, Shibata, or Gür and in further view of Harris (Quantitative Chemical Analysis, 5th Ed., 1999, pp. 93-102). Harris is being cited and relied on for the first time with this office action.

18. With respect to these method claims, Inoue in view of Yamada, Shibata, or Gür set forth providing the specified sensor (see discussion above) and Inoue further showed that the sensor response for its sensor in fig. 12. Inoue did not explicitly disclose that the presence of the organic contaminant comes from a difference between the potential difference during the presence of the organic contaminant and the potential difference during the absence of the organic contaminant. However, one possessing ordinary skill in the art would understand that for calibration purposes, any use of the sensor of Inoue functioning as shown in fig. 12 would require any organic contaminant measurement be based on the difference in the potential when the contaminant is present and is absent. In particular, the 0 ppmC signal for the sensor of Inoue is 225 mV. In calibration parlance, this is the intercept (b in Harris) and any use of any calibrated analytical measurement requires the intercept be determined and accounted for. For example, Harris shows that a traditional calibration curve is $y = mx + b$ where m and b are determined empirically from known x's and measured y's. See Harris pp. 93-102. The use of this calibration curve for a determination of an unknown x would require this equation be rearranged to be $x= (y-b)/m$. Relating this equation to Inoue, y would be a measurement during the presence of an organic contaminant (e.g. 300 mV for an unknown 450 ppmC concentration of CH_4) and b would be from a measurement in the absence of an organic contaminant (i.e. the 225 mV intercept for 0 ppmC CH_4) and a conventional calibration of Inoue would require the intercept 225 mV to be subtracted from the 300 mV measurement (i.e. y-b) for the unknown determination. See the Harris example on p. 99 where the intercept of 0.004 is subtracted from the measured value for the determination of an unknown. Hence, Harris teaches that the sensor of Inoue for unknown concentrations of organic contaminant would require a difference be taken

between a potential measurement taken during the presence of the organic contaminant and a potential measurement taken in the absence of an organic contaminant. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Harris for the method of Inoue in view of any of Yamada, Shibata, or Gür because Harris is drawn to conventional calibration processes and the use of conventional calibration processes for the sensor of Inoue would have required only routine skill in the art.

19. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Inoue in view of Yamada and Harris as applied to claim 14 above, and further in view of either Shibata or Gao.

20. Claim 17 is further obvious over the rejection for claim 14 in view of Shibata or Gao for the reasons set forth for claim 8 above.

Response to Arguments

21. Applicant's arguments filed 6/23/2009 have been fully considered but they are not persuasive. Applicant urges that the amendment to claims 1 and 14 read away from the claimed reference environment of Inoue. However as discussed in detail above, it is unclear whether the present invention even reads on this new limitation. In particular, the embodiment of fig. 2 discloses a pump cell with current source 34 that would either pump oxygen into or out of the reference environment via the anion conductor 12, in a manner analogous to what applicant urges Inoue suggests doing. As claim 8 evidences, applicant has not surrendered this embodiment so it is entirely unclear how applicant's amendment can be deemed to read free of the teaching of Inoue in view of Yamada when Inoue in view of Yamada would generate or consume oxygen in the reference environment in a similar manner.

22. Moreover, even if the examiner were somehow persuaded by the applicant's arguments that the process of Inoue somehow reads free of this new limitation, this argument ignores the fact that both of the secondary teachings of Gür and Shibata teach reference environment generation that would not rely on the claimed solid state oxygen anion conductor. In particular, Gür teaches the use of a solid reference compound and doesn't rely on any reference environment being formed by the electrolyte. In fact, Gür is drawn to the same scheme as set forth in claim 6 of the present invention. Shibata teaches that the reference gas can be generated either by the same oxygen anion conductor as that containing the measurement and reference electrodes (i.e. the oxygen anion conductor equivalent to the claimed anion conductor) (see the embodiments of fig. 1 or 5), or could be generated by an oxygen anion conductor that is not the same as the claimed oxygen anion conductor (fig. 2, 4, or 6). In the case of the embodiment of fig. 2, 4, and 6, the reference environment would not have been formed by "the solid state oxygen anion conductor", but instead by a separate oxygen anion conductor. With respect to these secondary teachings, applicant broadly urges that it would not have been obvious to combine any of Gür or Shibata because the generation of a reference environment formed by the solid electrolyte is at the heart of Inoue's disclosure and any substantial change would defeat the purpose of Inoue. Applicant does not follow up this broad assertion with any specific points so it is unclear how applicant claimed to this conclusion. It is unclear how the reference environment means of Inoue is at the heart of its invention when Inoue never explicitly explained how it utilizes its reference electrode in the first place (prompting the examiner to rely on Yamada for an explanation of the unspecified system of Inoue). Moreover, Inoue doesn't appear to have

claimed its reference electrode or reference electrode environment in any of the independent claims, so clearly its reference gas system is not critical to its gas sensor.

23. Applicant's arguments about the further use of Aagard, Gao, or Harris appear to rely on the applicant's perceived failings of the earlier Inoue rejections. Because those arguments were not persuasive as set forth above, these further arguments are also not persuasive.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795
October 19, 2009